Availability

Definitions

- **Reliability** is the probability (likelihood) a system will perform its intended function with no failures during a specified period of time (mission time) under specified conditions (environment).
- **Maintainability** is the probability that a failed item will be restored or repaired to a specified condition within a period of time.
- As a function of reliability and maintainability (R&M), **Availability** is the probability that a repairable system will perform its intended function at a given point in time or over a specified period of time when operated and maintained in a prescribed manner.
- Note: It is availability and not reliability that addresses downtime (e.g., time for maintenance, repair, and replacement activities). It is important to determine if the management question or system requirement is limited to reliability or if it pertains to availability.

Types of Availability

- As with reliability, availability can be either a demonstrated or predictive measure of performance.
- **Demonstrated availability** is (uptime) / (uptime + downtime).
- **Predictive availability** has three types, namely:
    - Point Availability at time t
    - Interval Availability over the time period from t_1 to t_2, and
    - Steady-State Availability or over the long run as $t \rightarrow \infty$.
- **Steady-state availability** has three common forms, namely:
    - Inherent Availability
    - Achieved Availability, and
    - Operational Availability.
- **Inherent availability** is based solely on the failure (reliability) distribution and the downtime distribution (maintainability) and is an important system design parameter for trade studies.

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